BS EN 1647:2012

BSI Standards Publication

Leisure accommodation vehicles — Caravan holiday homes — Habitation requirements relating to health and safety

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National foreword

This British Standard is the UK implementation of EN 1647:2012. It supersedes BS EN 1647:2004 + A1:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/511, Buildings mobile and temporary.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Véhicules habitables de loisirs - Résidences mobiles - Exigences d'habitation relatives à la santé et à la sécurité

Bewohnbare Freizeitfahrzeuge - Mobilheime - Anforderungen an den Wohnbereich hinsichtlich Gesundheit und Sicherheit

This European Standard was approved by CEN on 16 June 2012.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 1647:2012) has been prepared by Technical Committee CEN/TC 245 “Leisure accommodation vehicles”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2013, and conflicting national standards shall be withdrawn at the latest by January 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1647:2004+A1:2008.

The main technical changes are:

a) General protection against falling out for bunks was amended (see 6.1.3.1);

b) Materials for drinking water supply and drainage systems were changed (see 7.1.2);

c) Requirements for emergency windows and emergency panels were amended (see 10.1.6);

d) Figure 2 Positioning of window or escape panel has been deleted;

e) Informative Annex on environmental aspects added (see Annex J).

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Figure 1 gives an overview of the relevant European Standards for caravans, motor caravans and caravan holiday homes.

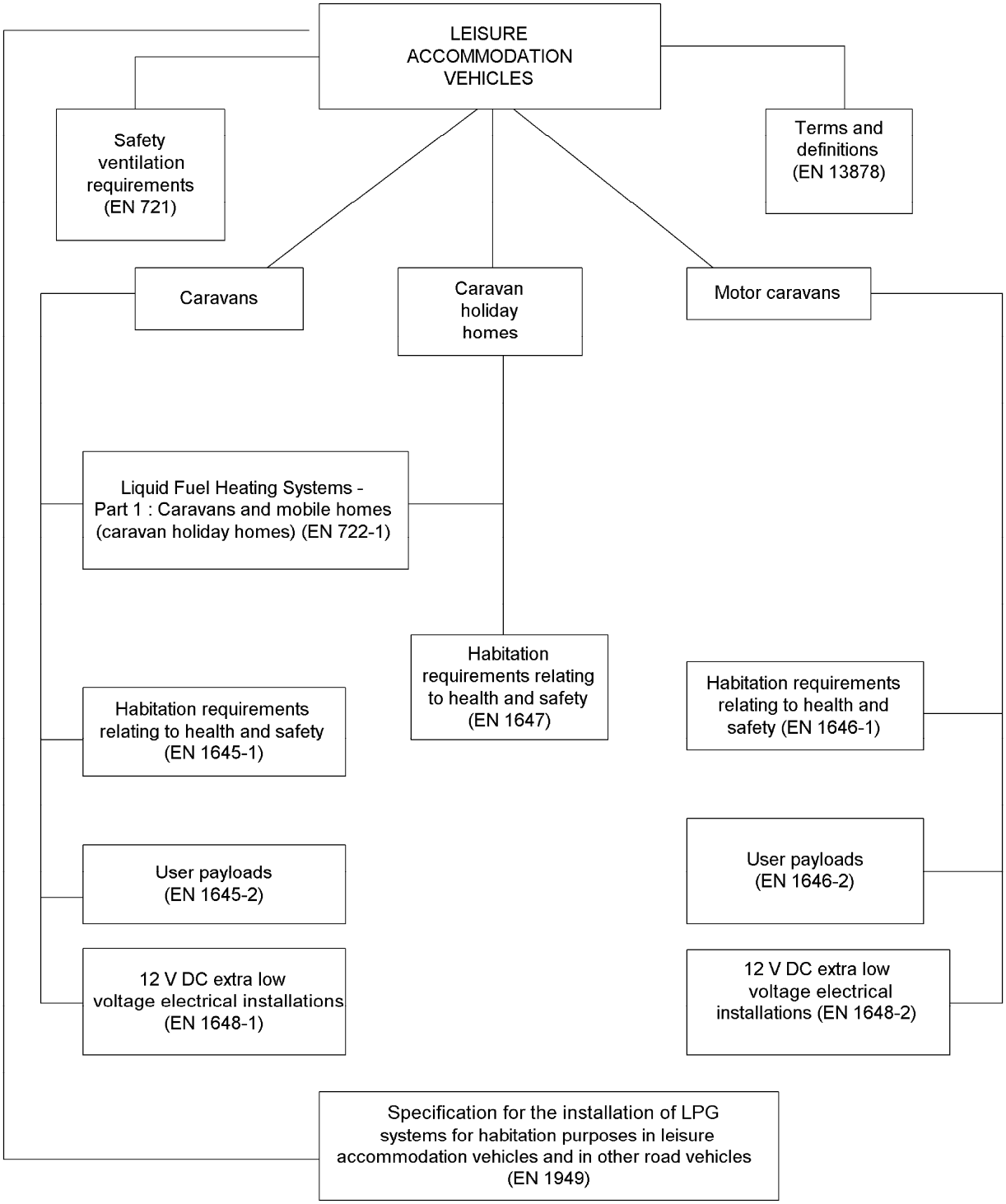


Figure 1 — Overview of relevant European Standards applying to leisure accommodation vehicles

1 Scope

This European Standard specifies requirements intended to ensure safety and health of persons using caravan holiday homes as defined in 3.1, as temporary or seasonal accommodation.

It specifies grades of resistance to snow loads and the stability of the structure of caravan holiday homes as well as the minimum information to be included in a User's Handbook.

It also specifies the corresponding test methods.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 624, *Specification for dedicated LPG appliances — Room sealed LPG space heating equipment for installation in vehicles and boats*

EN 721, *Leisure accommodation vehicles — Safety ventilation requirements*

EN 722-1, *Leisure accommodation vehicles — Liquid fuel heating systems — Part 1: Caravans and caravan holiday homes*

EN 1949, *Specification for the installation of LPG-systems for habitation purposes in leisure accommodation vehicles and accommodation purposes in other vehicles*

EN 13878:2003, *Leisure accommodation vehicles — Terms and definitions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13878:2003 and the following apply.

3.1
caravan holiday home
transportable leisure accommodation vehicle that does not meet requirements for construction and use of road vehicles, that retains means for mobility and that is for temporary or seasonal occupation

4 Testing

The tests described in Annexes A to I, are intended to verify that a caravan holiday home representative of a given model including its fixtures and fittings, meets the requirements of this European Standard.

These tests are intended to simulate the most onerous conditions, for the relevant characteristics.

NOTE It is recommended to take environmental aspects into account during development, production and disposal of caravans based on established knowledge and within the respective technical possibilities (see also Annex J).

5 Design and construction

5.1 Occupancy

The manufacturer shall designate the occupancy as the number of berths, both standard and additional berths, provided by the manufacturer and shall include it in the User's Handbook and his brochures. The occupancy is also necessary to determine the ventilation requirements (see EN 721).

5.2 Ceiling height

The ceiling height, measured internally from finished floor level to underside of finished ceiling, shall be not less than 1 980 mm.

The finished floor level shall be measured from the upper surface of any continuous fixed floor covering. This includes any vinyl carpet backing but not carpet pile.

5.3 Glazed Areas

The living area, the area for meals and the kitchen shall each be provided with windows, the total glazed areas of which shall be equivalent to not less than 10 % of their respective floor areas. Sleeping accommodation shall be provided with glazed area not less than 5 % of the floor areas. An exterior glazed area can be classed as a window for this purpose.

Glazed areas to the living area, the area for meals and the kitchen shall have an openable area equivalent to 5 % of each respective floor area (see also 10.1.6).

The floor area of the unit should be calculated from the total internal floor area excluding partition walls and separate fixed compartments which extend the full internal height of the unit. All floor area covered by fixed or loose furniture that does not extend the full height of the unit should be counted into the area. Transparent or translucent roof lights may be classed as glazed area.

5.4 Doors

At least one exterior door which opens outwards shall be provided.

Sliding doors will be deemed to be acceptable provided that the sliding operation of the door is not obstructed by a permanent fitting and the door, when open, does not obstruct any emergency exit.

5.5 Glazing

Glass in external windows, panels and doors that are less than 800 mm above finished floor level shall be safety glazing.

NOTE Pending harmonized European requirements for the assessment of the safety glazing, attention is drawn to national requirements which may apply.

5.6 Kitchen location

When a separate kitchen compartment is provided, that can be closed off from other parts of the caravan holiday home by fully closing doors, there shall be two doors, separated by a space, ventilated to the exterior, between the kitchen and the toilet compartment.

5.7 Classification of thermal insulation and heating

The thermal insulation and heating levels for specific climatic conditions shall be classified as follows:

a) grade 1: A caravan holiday home, including windows, doors and roof lights in which the average thermal transmittance (U) of the elements of construction shall not exceed 1,7 W/($m^2 \cdot K$). There is no heating requirement for this grade;

b) grade 2: A caravan holiday home, including windows, doors and roof lights in which the average thermal transmittance (U) of the elements of construction shall not exceed 1,7 W/(m^2 . K);

   An average temperature difference of at least 20 K between inside and outside temperatures shall be achieved in lounge, dining room and kitchen, when the outside temperature is 0 °C;

c) grade 3: A caravan holiday home, including windows, doors and roof lights in which the average thermal transmittance (U) of the elements of construction shall not exceed 1,2 W/(m^2 . K).

   An average temperature difference of at least 35 K between inside and outside temperatures shall be achieved in all rooms, except the toilet compartment, when the outside temperature is –15 °C.

   Precautions shall be taken to ensure that all water services still operate when the outside temperature is –15 °C.

For grade 1, the average thermal transmittance (U) shall be calculated in accordance with the relevant parts of Annex A. For grades 2 and 3, the average thermal transmittance (U value) and heating requirements shall be calculated in accordance with Annex A.

5.8 Roof space ventilation

Where there is an air gap between the external roof skin and the insulation material this air gap shall be ventilated to the external air.

If space allows, one high level ventilator and one low level ventilator shall be provided.

5.9 Underfloor

Underfloor insulation, if provided, shall be protected to reduce the possibility of degradation by birds or other animals (for example: rodents).

5.10 Fire behaviour of materials

NOTE Pending harmonized European requirements for the assessment of the fire behaviour of materials, attention is drawn to national requirements which may apply.

5.11 Stability (resistance to overturning)

Caravan holiday homes of all grades shall be provided with suitable holding-down points, each capable of resisting 10 kN.

Holding down points shall be located at (1 000 ± 200) mm from the ends of the main longitudinal chassis members at each corner of the caravan holiday home.

The manufacturer shall indicate the position of the holding down points in the User's Handbook.

5.12 Structural classification of caravan holiday homes

The structure of a caravan holiday home shall be graded according to its ability to withstand one of the following snow loadings:

a) grade A: A caravan holiday home Grade A resting on its normal supports as defined by the manufacturer shall be capable of resisting a snow load of 750 Pa[1)], exerted uniformly over the roof;

b) grade B: a caravan holiday home Grade B resting on its normal supports as defined by the manufacturer shall be capable of resisting a snow load of 1 500 Pa[1)], exerted uniformly over the roof;

c) grade C: A caravan holiday home Grade C resting on its normal supports as defined by the manufacturer shall be capable of resisting a snow load of 2 000 Pa[1)], exerted uniformly over the roof;

d) grade D: A caravan holiday home Grade D resting on its normal supports as defined by the manufacturer shall be capable of resisting a snow load of 3 000 Pa[1)], exerted uniformly over the roof.

Compliance can be verified either by the submission of the calculations of a qualified structural engineer or by testing in accordance with Annex B.

The structure is considered to have passed the test if it remained safe and returned to an acceptable condition on removal of the load applied. To satisfy the requirement of “remain safe”, all designated means of escape egress from the unit (doors and windows) shall function during and after the test.

6 Internal equipment

6.1 Bunks

6.1.1 Mattress and/or upholstery

Bunks shall be provided with mattresses or be upholstered.

6.1.2 Clearance

The clear width of a bunk shall be not less than 500 mm. The clear height over two-thirds of the surface area of the bunk shall be not less than 500 mm when measured from the compressed surface of the mattress or upholstery in accordance with the test in Annex C.

6.1.3 Protection against falling out

6.1.3.1 General

Any bunk where the uncompressed upper surface of the mattress or upholstery is placed at a height of more than 1 000 mm from the floor, shall be protected on all sides to prevent the occupant from falling out. Any gap between one element of protection and another shall conform to 6.1.7. Nevertheless, no gap shall exceed 75 mm.

All protections shall be secured against unintentional loosening.

Upper bunks shall be provided with a label with the following wording:

"Not suitable for children under 6 years old without supervision".

1) Provisional until confirmation by EUROCODE 1.

6.1.3.2 Rigid protection

For rigid protection, the minimum height of the protection shall be at least 150 mm above the uncompressed upper surface of the mattress or upholstery. To allow entry, an access gap of 350 mm to 550 mm measured at its narrowest point shall be provided.

Where a rigid protection presents an apparent flexibility, its resistance shall be tested in accordance with Annex D.

A protection is considered as rigid if it is not bent more than 10 mm under a force of 100 N applied horizontally in the middle of the protection.

6.1.3.3 Protection by curtains or nets

Alternatively, the protection may be obtained by means of curtains or nets. The minimum height of the protection shall be at least 160 mm above the uncompressed upper surface of the mattress or upholstery, when the upper edge is loaded with 100 N in a vertical direction downward.

To allow access to the bunk, the curtains or nets on at least one side of the bunk may be detachable allowing an opening 350 mm to 550 mm.

Means of emergency exit from the bunk shall be accessible from the upper surface of the bunk.

The curtains or nets shall be capable of resisting a force of 100 N applied horizontally towards the outside of the bunk for 15 s to any point and this shall not result in any tearing nor detaching nor creating any gap larger than 60 mm at the lower edge of the protection.

The strength of the curtains or nets shall be tested in accordance with Annex D.

Any gap created during the resistance test shall be measured in accordance with Annex H.

6.1.4 Mechanical strength

A force of 1 000 N applied vertically downwards, for 1 h, from the midpoint of each side member of any bunk where the upper surface of the compressed mattress or upholstery is placed at a height of more than 500 mm from the floor, shall neither cause permanent deformation of more than 5 mm of the frame of the bunk nor damage the fixing of the bunk to the structure of the caravan holiday home.

The mechanical strength shall be tested in accordance with Annex E.

6.1.5 Security of folding bunks

If a bunk is designed to fold away, it shall be secured against unintentional folding away.

A folding bunk shall not unintentionally move from its stored position. Both conditions will be tested in accordance with Annex F.

6.1.6 Access to upper bunks

A means of access to an upper bunk shall be provided, such as surfaces of furniture, footholes in a solid component, handles or a ladder which may be fixed or be able to be attached to the bunk in a safe manner.

The width of the treads between positive supports shall be at least 250 mm.

The distance between the top foothold and the uppermost part of the bed structure, e.g. the side rail or safety barrier, at the point of access shall not be more than 400 mm.

When a ladder is used, the upper surfaces of the treads shall be equally spaced within a tolerance of ± 12 mm, and the unobstructed distance between consecutive treads shall be (225 ± 25) mm.

When tested in accordance with Annex G, the ladder shall not move when subjected to a downward static load of 1 000 N and a horizontal static load of 500 N; nor shall the ladder or its treads break or deflect permanently by more than 5 mm.

Where it is impractical to test the bunk ladder in the caravan holiday home, it is acceptable to test an identical configuration of the ladder, its method of fixing and its range of positions of use, outside the caravan holiday home according to Annex G.

6.1.7 Protection against entrapment

When ready for use, a bunk and its means of access shall not contain any open-ended tubing; nor shall there be projections, holes, loose washers, speed fixing nuts or crevices on which clothing or any part of the body could become snagged or trapped. Tension springs in the base structure are excluded. All edges, corners and projecting parts that are accessible shall be free from burrs and sharp edges.

If the base of a bunk is not covered by permanently fixed upholstery, any gap in the base not covered by the mattress shall not permit the passage of the cone (see H.1) beyond the point at which the diameter of the cone is 75 mm, when measured from above in accordance with H.2.

Any other gap or space within the structure of the bunk which is accessible from the upper surface of the bunk, including mattress where applicable, shall be between 12 mm and 25 mm or between 60 mm and 75 mm, (tested in accordance with H.3) or equal to or larger than 200 mm.

When a gap cannot be tested because a constructional feature prevents proper positioning of the cone, the constructional feature may be removed to the extent necessary to allow the tests to be carried out.

6.2 Cooking appliance

If space is provided for the installation of a cooker, the space shall be at least 540 mm wide by 600 mm deep.

6.3 Toilets (W.C.)

If a W.C. is fitted, by the manufacturer of the caravan holiday home, it shall be capable of being connected to an external drainage system.

6.4 Lighting

There shall be provision of artificial lighting in all habitable areas of a caravan holiday home.

6.5 Appliances

6.5.1 Installation of appliances

Appliances shall be installed in accordance with the appliance manufacturer’s instructions.

NOTE It is essential that the appliances as well as their installation are in accordance with European Directives and Standards in force for the corresponding appliance.

6.5.2 Restriction concerning the supply or use of appliances

The restrictions concerning the supply and use of heating appliances in caravan holiday homes are detailed in EN 1949.

NOTE Attention is drawn to national requirements which might apply.

6.5.3 Flue pipes

LPG and liquid fuel fired heating appliances shall be flued.

Flue pipes shall be constructed of non-combustible material (see 8.2 and 8.3) and comply with EN 624 and EN 1949, as applicable.

7 Drinking water supply and drainage systems

7.1 Drinking water

7.1.1 Supply

A caravan holiday home shall be equipped with a system for supplying drinking water.

Any drinking water tanks shall be capable of being flushed and cleaned.

7.1.2 Materials

All materials in contact with drinking water shall be of food contact quality.

NOTE For materials in contact with drinking water attention is drawn to the requirements of the Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption" and national requirements for the country of first destination.

7.1.3 Supply coupling

A supply coupling for drinking water shall be provided with a sealing off cover and fixed rigidly to the caravan holiday home.

It shall be situated at an easily accessible point on the outside of the caravan holiday home.

7.2 Drainage system

A caravan holiday home shall be provided with a drainage system capable of conveying waste water and sewage to an external mains drainage system.

8 Installations

8.1 Electricity

Low voltage electrical installations in caravan holiday homes shall comply with the safety requirements for electrical installations including any national safety requirements.

8.2 Liquefied petroleum gas (LPG)

LPG installations shall conform to EN 1949.

NOTE For LPG appliances, attention is drawn to the requirements of Council Directive 2009/142/EC of 30 November 2009 on the approximation of the laws of the member states relating to appliances burning gaseous fuels.

8.3 Liquid fuel

Liquid fuel fired heating shall conform to EN 722-1.

9 Ventilation

9.1 Safety ventilation

Safety ventilation shall be provided and shall conform to EN 721.

9.2 Additional ventilation

9.2.1 Larder and food storage

Each cupboard or locker intended for the storage, of perishable food, shall be ventilated to the external air.

The minimum free area of ventilation for each cupboard or locker shall be 200 mm^2.

9.2.2 Fold-away beds

If, when folded away, a mattress and its bedding are totally enclosed, ventilators shall be incorporated to permit a flow of air through the enclosure. Such ventilators shall not communicate with the air outside the caravan holiday home.

The minimum free area of ventilation for each enclosure shall be 200 mm^2.

9.2.3 Wardrobes and bed lockers

Each wardrobe and bed locker shall be ventilated within the caravan holiday home. Wardrobes shall be ventilated at the bottom and top and shall be designed to permit the free passage of air between the ventilators. Such ventilators shall not communicate with the air outside the caravan holiday home.

The minimum free area of ventilation for each wardrobe, or bed locker shall be 200 mm^2.

A bed locker shall be defined as a locker situated under a berth. For a wardrobe, there shall be two ventilators, each with a minimum area of 100 mm^2, positioned within 25 % of the top and 25 % of the bottom of the wardrobe.

10 Fire precautions

10.1 Means of escape

10.1.1 General

The living area, the areas for preparation and consumption of meals and the sleeping areas shall each be provided with an emergency exit (door, panel or window) which gives direct access to the open air. This requirement includes each sleeping area formed as a result of permanent or temporary partitioning (see 10.1.4 or 10.1.6, as applicable).

10.1.2 Escape path

It shall be possible to reach an emergency exit by means of an unobstructed escape path.

Objects such as drawers, doors, bunk ladders, etc that can be moved quickly and easily from the escape path, emergency exit or door with a single movement shall not be considered as obstructions.

An escape path shall be at least 450 mm wide.

10.1.3 Toilet compartments

Toilet compartments shall be equipped with an emergency exit unless:

a) the compartment door is situated less than 2 000 mm from an emergency exit of the caravan holiday home. This distance or sum of distances is measured from the door handle of the toilet compartment to the nearest part of the emergency exit aperture passing through the escape path; or

b) it is possible to escape from an emergency exit in an adjacent compartment that does not have any naked flame appliances installed.

10.1.4 Emergency doors

Emergency doors shall open outwards or slide horizontally and shall provide a clear opening of not less than 1 800 mm high and 700 mm wide. The door lock(s), even if locked from the outside, shall be capable of being immediately opened from the inside. This requirement is considered fulfilled if opening of the emergency door can be performed in not more than two operations.

If an external sliding door is fitted, this shall be suitably screened to prevent its movement from being obstructed and shall be clearly marked with an arrow indicating the direction of opening.

10.1.5 Interior doors

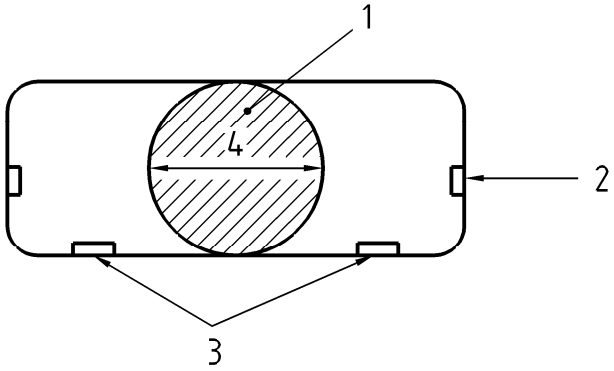
Opening mechanisms for interior doors shall be capable of being operated from both sides. When fitted, lever handles shall open interior doors by being pushed downwards.

Where an interior door between compartments is fitted with a locking mechanism on one side, an emergency unlocking system shall be fitted on the other side.

10.1.6 Emergency windows and emergency panels

Emergency windows and emergency panels shall open outwards or inwards, or slide horizontally and shall provide a clear opening, free from obstruction, of not less than 0,25 m^2, with a minimum dimension in any one direction of 450 mm. All inward opening emergency windows or emergency panels shall be hinged on their right or left vertical edge, and shall be capable of opening so that the escape path conforms to 10.1.2. without any interference with furniture.

For compartments exclusively for the use of children and in which there are two bunks above the lower bunk, the minimum dimension in any one direction may be reduced to 350 mm so long as the clear opening shall be not less than 0,25 m^2 (see Figure 2). Any projecting element shall be deducted from the total area of the aperture (e.g. catches, locks, fixing for window stays, blinds).



Key

1 disc of rigid material of the minimum dimension to check the emergency exit
2 window stay fixing points
3 window catches
4 350 mm or 450 mm

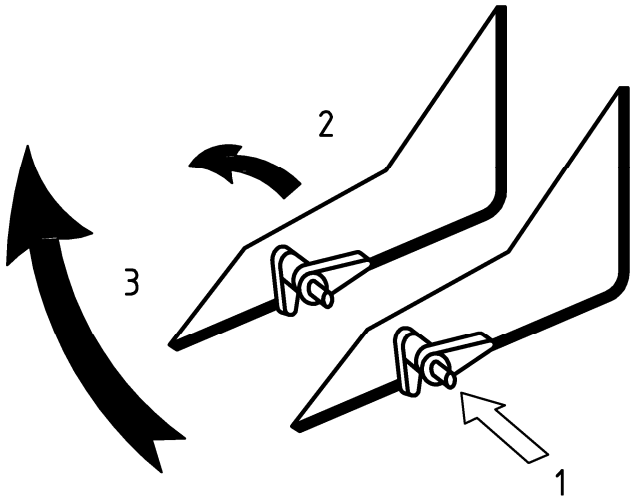
Figure 2 — Verification of the minimum dimensions of a window or escape panel

The lower edge of the opening of any emergency window or panel shall be not more than 950 mm above the floor level of the caravan holiday home.

If a bed, bunk or fixed furniture located permanently under an emergency window or panel, it may be considered as an access step to the emergency window or panel. The emergency window or panel shall not be more than 1 100 mm above the floor level of the caravan holiday home.

All outward opening emergency windows or emergency panels may be hinged on their vertical or upper edges; windows hinged on their upper edges shall be capable of opening through at least 70° and shall stay fully open until closed manually.

Opening of an emergency window or an emergency panel shall not require more than three operations in addition to opening curtains, blinds or fly screens. The use of two hands for a simultaneous operation shall be considered as one operation. After the final operation, emergency windows or emergency panels shall remain fully open until closed manually. One operation is a train of movements effected without removing the hand from the element on which it is acting (e.g. 1, 2 and 3 successively) (see Figure 3).



Key

1, 2, 3 successively performed movements

Figure 3 — Typical single operation of several continuous movements

10.1.7 Obstruction of doors, escape paths or emergency exits

No part of any furniture or equipment, fitted by the caravan holiday home manufacturer, shall obstruct an entrance door, an escape path or an emergency exit.

10.2 Protection of surfaces adjacent to heat generating appliances

Such appliances shall be installed in accordance with the appliance manufacturer's instructions.

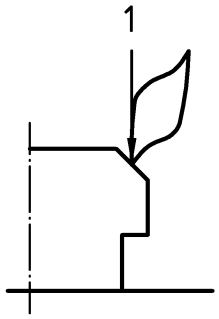
NOTE It is essential that protection of surfaces adjacent to heat generating appliances is achieved by ensuring that heating and cooking appliances are inspected and certified in accordance with the European Directives and Standards in force for these appliances.

10.3 Protection of flammable elements

10.3.1 Rigid elements

All rigid elements manufactured from inflammable materials shall be at a minimum distance of 200 mm from an open flame, measured from the point of emission of the flame (see Figure 4) except if these elements are protected by non-flammable material. Protection made of non-flammable material may be fixed or hinged, but shall not be removable without tools.

Movable rigid elements shall be checked in their most adverse position.



Key
1 point of emission

Figure 4 — Point of emission of the flame

10.3.2 Non-rigid elements

All non-guided elements such as curtains or non-guided blinds situated at less than 900 mm from the point of emission of the flame of a burner shall be inspected to ensure that they cannot be blown to within 300 mm, except when these elements are protected by non-flammable material.

The vertical dimensions of such non-flammable protection shall be the greater of:

a) 300 mm above the point of emission of the flame; or

b) equal to or higher than a line drawn between the point of emission of the flame and the closest point at which the element is suspended.

Elements shall be considered when they are open (pulled back), disregarding any storage devices.

10.4 Hotplates

In the case of open flame hotplates, the following requirements shall be met:

a) the surface below the burner shall be non-flammable;

b) where the appliance is provided with a cover which is likely to come into contact with the pan supports, the cover shall have an inner lining of non-flammable material.

11 Warning notice

11.1 Provision of warning notice

A warning notice, worded at least in the language of the country where the caravan holiday home is first sold, not less than 200 mm by 130 mm, giving simple fire safety advice and setting out the action to be taken in the event of fire, shall be fixed inside the caravan holiday home in a position where it can be easily and readily seen. The inside of a wardrobe or toilet compartment door is permissible.

The height of the lettering for the headings, which shall be printed in red, shall be not less than 6 mm and for the text, in black, not less than 3 mm.

11.2 Content of warning notice

The content of the warning notice shall be as follows:

Safety advice to users

Ventilation

Do not obstruct the permanent ventilation openings which are fitted, your safety depends on them.

in case in fire

1 - Get everyone out;

2 - Turn off outside gas valve and/or liquid fuel valve (if fitted);

3 - Disconnect the mains electricity supply;

4 - Raise the alarm and call the fire brigade;

5 – Fight fire if safe to do so.

Fire precautions

CHILDREN: DO NOT LEAVE CHILDREN ALONE

Means of escape. Make sure you know the location and operation of the emergency exits. Keep all escape routes clear.

Combustible materials. Keep them clear of all heating and cooking appliances.

Fire fighting. Provide one dry powder fire extinguisher of an approved type or complying with EN 3-7 of at least 1 kg capacity, by the main exit door, and a fire blanket next to the cooker. Familiarise yourself with the instructions on your fire extinguisher and the local fire precaution arrangements.

12 User's handbook

There shall be provided with every caravan holiday home a User's Handbook, worded at least in the language of the country where the caravan holiday home is first sold, containing at least, the following information:

Detailed specifications

— Overall dimensions of caravan holiday home

— Grade of snow loading

— Explanation of thermal insulation and heating grade

— Correct installation on site including support and holding down points

Systems, appliances and equipment

Systems diagrams, user instructions, safety precautions and, where applicable, input in kilowatts of appliances, for the following systems, appliances and equipment:

— location of emergency exits;

— circuit diagram(s) for low voltage electricity;

— liquefied petroleum gas;

— drinking water supply and waste water drainage;

— ventilation, to include location of openings and method of cleaning any protective screens;

— heating.

When no heating appliances have been factory installed but space and connections have been provided for them, the recommended type and rated power of such appliances shall be stated.

If no refrigerator has been fitted, but space has been provided for one to be fitted later, indicate in the handbook in addition to the dimensions of this space, the provisions which have been made to connect the refrigerator to the electrical and/or gas installations.

Other operating instructions

How to connect and disconnect gas cylinders or containers.

Maintenance

Recommendations for periodic maintenance of the caravan holiday home, bodywork, windows, doors, fittings, systems and appliances.

A statement worded as follows:

"In the interest of safety, replacement parts for an appliance shall conform to the appliance manufacturer's specifications and should be fitted by him or his authorized agent".

Warning instructions

These shall recommend the following:

— **use** upper bunks for sleeping only, with protection against falling out in position;

— care shall be taken against the risk of falling out when upper bunks are used by children, especially under 6 years of age. These bunks are not suitable for the use by infants without supervision;

— **do not** obstruct ventilation;

— **inspect** flexible gas hose(s) regularly for deterioration and renew, as necessary, with the approved type, in any case not later than the expiration date marked on the hose(s);

— **provide** one dry powder fire extinguisher of an approved type or complying with EN 3-7 of at least 1 kg capacity by the main exit door, and a fire blanket next to the cooker. Familiarise yourself with the instructions on your fire extinguisher and the local fire precaution arrangements;

— **never** use portable cooking or heating equipment, other than electric heaters that are not of the direct radiant type, as it is a fire and asphyxiation hazard;

— **never** allow modification of electrical or LPG systems and appliances except by qualified persons. Care should be taken that any additional equipment or appliances are installed in accordance with the appliance/equipment manufacturers instructions (e. g. air conditioning, satellite dish, bicycle rack).

— care shall be taken when snow load is excessive. It is important that high level ventilators and appliance flues are not blocked.

Annex A
(normative)

Thermal insulation - Method of calculation (see 5.7)

A.1 Explanation of terms used

A.1.1 Thermal transmittance, U: Measure of thermal insulation of an element of structure indicating the quantity of heat which flows through a unit area in unit time per unit difference of temperature between the interior and exterior of the structure It is expressed in watts per square metre kelvin where K is the temperature difference (thermodynamic temperature).

A.1.2 Thermal conductivity, λ: Property of a single material independent of thickness; it is a measure of the rate at which heat will flow through a material when a difference exists with the temperature of its surface. It is expressed in watts per metre kelvin.

A.1.3 Thermal resistance, R: Measure of the overall thermal resistance to heat of a material or combination of materials. It is expressed in square metres kelvin per watt.

A.1.4 Surface resistance, R_{si} **and** R_{se}: Thermal resistance of the interior or exterior surfaces respectively. Heat is transferred at the surface by radiation and convection and the quantity is affected by the type of surface, the direction of heat flow and exterior air movement. It is expressed in square metres kelvin per watt.

Typical surface resistance values are as given in Table A.1

NOTE Further information on physical quantities and definitions may be found in EN ISO 7345 *Thermal insulation – Physical quantities and definitions*.

Table A.1 — Typical surface resistance values

Surfaces		**Value** $m^2 \cdot K/W$
Interior surfaces, R_{si}	walls	0,12
	roofs	0,10
	floors	0,17
Exterior surfaces R_{se}	walls	0,04
	roofs	0,04
	floors	0,04
Combined $R_{si} + R_{se}$	walls	0,16
	roofs	0,14
	floors	0,21

A.2 Objectives of calculation

The objectives are as follows:

a) to determine the U value of a caravan holiday home;

b) from a) to calculate the heating needs of the caravan holiday home for a given climatic condition.

A suggested way of recording details of the calculation is shown in Table A.5.

A.3 Method of calculation

A.3.1 General

The U value of any part of the structure of a caravan holiday home is obtained by combining the thermal resistance of its component parts and the adjacent air layers. It is expressed in watts per square metre kelvin, see formula (A.1):

$$U = \frac{1}{R_{si} + R_1 + R_2 + R_3 + ... + R_{se}} \quad \text{(A.1)}$$

where

R_1, R_2, R_3 are the thermal resistances of the components of that part of the structure (e.g. plywood, insulator, aluminium sheet).

A.3.2 Calculation of R_1, R_2, R_3

For each material used in the structure (e.g. plywood, insulator, and aluminium sheet), the thermal resistance, R, is given, in square metres kelvin per watt, by the formula (A.2):

$$R = \frac{d}{\lambda} \quad \text{(A.2)}$$

where

d is the material thickness, in metres;

λ is the thermal conductivity.

Typical values of λ are as given in Table A.2.

Table A.2 — Typical thermal conductivity values λ

Material	Thermal conductivity λ W/(m · K)
Acrylic resin sheet	0,2
Aluminium	160
Carpet	0,055
Chipboard	0,15
Glass fibre wool	0,04
Glass reinforced plastic	0,34
Hardboard	0,15
Plywood	0,14
Polypropylene	0,24
Polystyrene :	
— expanded;	0,034
— extruded	0,033
Polyvinyl chloride :	
— floor covering ;	0,04
— rigid ;	0,16
— rigid foam.	0,035
Polyurethane :	
— rigid foam.	0,026

For air spaces, typical values of R are as given in Table A.3.

Table A.3 — Typical air space thermal resistances

Air space thickness mm	Thermal resistance, R $m^2 \cdot K/W$
5	0,11
10	0,14
20	0,16
50 to 100	0,17

A.3.3 Calculation of thermal transmittance for one caravan holiday home wall, U_w

The term "wall" is used in these calculations to denote the floor or roof as well as the side, front or rear walls. Where applicable it includes windows. Exit doors are regarded as part of the wall.

The thermal transmittance of one wall, U_w is calculated, in watts per square metre kelvin, by the formula (A.3):

$$U_w = \frac{U_{ww}\,(A_w - A_z) + U_z \times A_z}{A_w} \qquad \text{(A.3)}$$

where

U_{ww} is the thermal transmittance of the wall structure, not including windows;

U_z is the thermal transmittance of the window(s);

A_w is the total area of the wall, including window(s);

A_z is the total area of the window(s).

Typical thermal transmittance values, U_z, for windows are given in Table A.4.

Table A.4 — Typical thermal transmittance values for windows, U_z

Material	U_z
Glass :	
— single glazed ;	5,7
— double glazed.	3,0
Acrylic :	
— single glazed ;	5,3
— double glazed.	2,7

A.3.4 Calculation of overall thermal transmittance of caravan holiday home, U_e

The overall thermal transmittance of the caravan holiday home, U_e is calculated in watts per square metre kelvin, by the formula (A.4):

$$U_e = \frac{(U_{w1} \times A_{w1}) + (U_{w2} \times A_{w2}) + (U_{w3} \times A_{w3}) + \ldots}{A_{w1} + A_{w2} + A_{w3} + \ldots} \qquad \text{(A.4)}$$

where

U_{w1} is the thermal transmittance of wall 1;

U_{w2} is the thermal transmittance of wall 2, etc;

A_{w1} is the total area of wall 1 including window(s);

A_{w2} is the total area of wall 2 including window(s), etc.

Thermal bridges are not taken into account in these calculations.

A.3.5 Losses of heat via the walls, k_w

Losses of heat via the walls, k_w, are given in watts per kelvin, by the formula (A.5):

$$k_w = U_e \cdot A_w \quad \text{(A.5)}$$

where

A_w is the total area of walls, ie $A_{w1} + A_{w2} + A_{w3} + A_{w4} + \ldots$;

U_e is the overall thermal transmittance of the caravan holiday home as calculated in A.3.4.

A.3.6 Losses of heat due to renewal of air, k_v

Losses of heat due to renewal of air, k_v are given in watts per kelvin, by the formula (A.6):

$$k_v = 0{,}33 \cdot N \cdot V \quad \text{(A.6)}$$

where

N is the number of air changes per hour (minimum of one);

V is the volume of space, in cubic metres.

A.3.7 Rated power of heating appliances, P

The rated power of heating appliances, P, is given in kilowatt, by the formula (A.7):

$$P = \frac{(k_w + k_v) \times \Delta T}{1\,000} \quad \text{(A.7)}$$

where

ΔT is the temperature difference between the required caravan holiday home interior temperature, θ_i and the expected exterior temperature, θ_e.

To this should be added a minimum of 10 % for preheating.

A.3.8 Temperature

As a basis for these calculations θ_i = 20 °C.

The minimum exterior temperature, $\theta_{e\,min}$, below which the heating system cannot produce a temperature of 20 °C inside the caravan holiday home is given in degrees Celsius, by the formula (A.8):

$$\theta_{e\min} = 20 - \frac{P}{k_w + k_v} \times 1\,000 \quad \text{(A.8)}$$

Table A.5 — Recording of thermal insulation calculations

Caravan holiday home model			**Type**
1	2	3	4
Part of		Area	Losses, k_w
caravan holiday home	U	A	(2) x (3)
	W/(m^2 ·K)	m^2	W/K
Wall 1			
Window(s) 1			
Wall 2			
Window(s) 2			
Front wall			
Window(s)			
Rear wall			
Window(s)			
Roof			
Window(s)			
Floor			
	Total	(5)	(6)
Total outer surface area of caravan holiday home (5) ..... m^2			
Total losses via "wall" (6) ..... W/K			
Total losses via "wall", k_w (6)		= ..... W/K	
Losses due to renewal of air, k_v = 0,33 · N · V		= ..... W/K	
Total losses (7)		= …… W/K	
Thermal transmittance of "walls", U_e = (6)/(5)		= ..... W/m^{2}K	
Rated power required P = (7) · ΔT/1 000		= ..... kW	
Minimum rated power of heater = 1,1 · P		= ..... kW	

External temperature, °C	10	5	0	-5	-15	-25	-35
Minimum temperature difference to maintain internal temperature, θ_i at 20 °C	10	15	20	25	35	45	55
Temperature difference required, K							
Rated power required, kW							

Annex B
(normative)

Snow Load Test

NOTE This test might be destructive.

B.1 Principle

This method is used to determine the snow loading capability of a caravan holiday home.

B.2 Preparation

a) Place the caravan holiday home on level solid ground;

b) ensure all windows and doors are closed;

c) jack and support the unit in accordance with the manufacturers instructions;

d) adjust supports until the floor of the caravan holiday home is level within an accuracy of ± 3° ;

e) trestles should be placed internally and extended to be close to roof, for example (100 – 150) mm ;

f) glazed windows and doors should be taped to reduce the risk of glass shattering if they were to break under load.

B.3 Loading procedure

a) Apply load gradually and uniformly to the roof structure, calculated in accordance to the snow loading grade to be tested;

b) maintain the load for 1 h;

c) check to ensure designated means of escape (doors and windows) are able to be opened. This should be carried out remotely to reduce the risk to the test operators;

d) remove the load;

e) enter the caravan holiday home and ensure that all designated means of escape open and close freely.

B.4 Expression of results

The caravan holiday home shall be considered to have passed the test in accordance with 5.12 if all designated means of escape (doors and windows) are capable of being manually opened and closed freely both during and after application of the load.

B.5 Test report

A test report shall be prepared stating whether the caravan holiday home passed or failed the test. If a failure occurred, the report shall state the following:

a) which emergency door(s), window(s) or panel(s) failed to open and close freely;

b) the nature of any failures.

NOTE It is acceptable to perform the test over the largest internal area, unsupported by internal walls if the roof structure is uniform.

Annex C
(normative)

Clear height over bunks (see 6.1.2)

C.1 Principle

This method of test is used to determine that an adequate clear height exists over any bunk in a caravan holiday home.

C.2 Preparation and procedure

a) Place a load spreading platform (see I.5) on the mattress or upholstery of the bunk so that the average height above the platform is maximised;

b) for bunks shorter than 1 700 mm, a load spreading platform 350 mm wide × the total length of the bunk shall be used;

c) place a total mass of 75 kg (see I.4) on the platform so that the load is equally distributed over the area of the platform;

d) record any points where there is not a clear height of 500 mm above the base of the platform.

C.3 Expression of results

The caravan holiday home shall be considered to have passed the test and to have adequate clear space above the bunks in accordance with the requirements of 6.1.2 if a clear height of 500 mm exists above the compressed surface of the bunk over an area of at least two thirds of the surface area of the bunk.

C.4 Test report

A test report shall be prepared stating whether the caravan holiday home passed or failed the test.

The report shall state the following, if applicable:

a) which bunk(s) in the caravan holiday home failed the test;

b) the minimum height recorded for each bunk which failed the test.

Annex D
(normative)

Strength of protection against falling out of bunks (see 6.1.3.3)

D.1 Principle

This method of test is used to determine the strength and fixation of protection against falling out of bunks.

D.2 Preparation and procedure

a) Place the bunk in its operating position according to the manufacturer's instructions;

b) fix to a load cell (see I.3) a ball of 100 mm diameter (see I.7);

c) fix any protection for the occupant of the bunk against falling out in position according to the manufacturer's instructions;

d) using the load cell apply a force of 100 N horizontally ± 5° outward from the bunk for 15 s;

e) observe if the curtains or nets tear or become detached, or if (a) rigid protection(s) present(s) a permanent deformation;

f) repeat steps d) and e) in three different places of the protection;

g) repeat steps a) to f) for each bunk, as applicable.

D.3 Expression of results

The caravan holiday home shall be considered to have passed the test if after this test has been completed on each bunk in the caravan holiday home, the curtains or nets did not tear or become detached, or if the rigid protection(s) did not present a permanent deformation.

D.4 Test report

A test report shall be prepared stating whether the caravan holiday home passed or failed the test.

The report shall state the following, if applicable:

a) which protection(s) failed the test and for what reason;

b) the nature of the failure, i.e. detachment, tearing or permanent deformation.

Annex E
(normative)

Mechanical strength of bunks (see 6.1.4)

E.1 Principle

This method of test is used to determine the mechanical strength of bunks, their frames and fixings when the compressed surface of the mattress or upholstery of the bunk is placed at a height of more than 500 mm from the floor.

E.2 Selection of bunk

Carry out the test procedures C.2 a), b) and c), described in Annex C, to determine whether the compressed upper surface of the mattress or upholstery exceeds a height of 500 mm above the floor. If the resulting height is over 500 mm, proceed with the test for mechanical strength of bunk as described in E.3.

E.3 Preparation and procedure

a) Place the load spreading platform (see I.4) flat on the surface of the centre of the bunk (± 200 mm) next to the long side member;

b) put a total mass of 100 kg on the load spreading platform within 200 mm of the midpoint of the long side of the bunk as close as possible to the edge of the bunk (see I.4);

c) maintain the load for a duration of 1 h;

d) remove equipment and measure any permanent deformation of the bunk frame and check whether there is visible damage to the bunk fixings;

e) repeat steps a) to d) for each side of the bunk;

f) repeat the test for each bunk of the caravan holiday home, as applicable.

E.4 Expression of results

A caravan holiday home shall be considered to have passed this test if the bunk(s) tested resisted the force of the test without any permanent deformation in excess of 5 mm or any visible damage to the bunk fixings.

E.5 Test report

A test report shall be prepared stating whether the caravan holiday home passed or failed the test.

The test report shall state the following, if applicable:

a) which bunk(s) failed the test and for what reason;

b) the extent and location of any permanent deformation of the bunk(s) in excess of 5 mm;

c) whether and where there was visible damage to the bunk fixings.

Annex F
(normative)

Security of folding bunks (see 6.1.5)

F.1 Principle

This method of test is used to determine that a folding upper bunk is secured against unintentional folding away.

F.2 Preparation and procedure

a) Place the folding bunk into its operating position according to the manufacturer's instructions;

b) attach the load cell (see I.3) to one outside corner of the bunk;

c) exert a force of 125 N vertically upwards;

d) observe whether the bunk becomes detached from its fixings;

e) repeat b), c) and d), fixing the load cell to the other outside corner and one other location between the two outside corners;

f) repeat steps a) to e) for each folding bunk in the caravan holiday home;

g) place the folding bunk in its stored position according to the manufacturers instructions;

h) attach the load cell (see I.3) to the centre of the upper edge of the bunk in its stored position;

i) exert a force of 125 N perpendicular with a tolerance of ± 10° to the plane of the stored bunk.

F.3 Expression of results

The caravan holiday home shall be considered to have passed the tests and for its bunks to be suitably secure against unintentional folding away and unintentional movement whilst stored in accordance with the requirements of 6.1.5 if, on completion of the test procedure in F.2, there was observed no detachment of the bunk(s) from its fittings.

F.4 Test report

A test report shall be prepared stating whether the caravan holiday home passed or failed the test.

The test report shall state the following, if applicable:

a) which bunk(s) failed the test;

b) the nature of the failure;

c) the position of the failure.

Annex G
(normative)

Safety of access to upper bunks (see 6.1.6)

G.1 Principle

This method of test is used to determine the safety of a ladder intended to provide access to upper bunks.

G.2 Preparation and procedure

G.2.1 General

a) Place the caravan holiday home or configuration on level ground within an accuracy of ± 2° (3,5 %);

b) place the bunk to be tested in its operating position;

c) fix the ladder in position in accordance with the caravan holiday home manufacturer's instructions.

G.2.2 Attachment and deflection

The vertical components of the ladder shall not be blocked.

Apply a 1 000 N load vertically downwards to the centre of the mid-tread or in case of an equal number 500 N to each of the two mid-treads.

Apply a 500 N horizontal load in the four positions shown in Figure G.1 and in the order indicated. The 500 N load shall be removed before being applied in another position.

The duration of loading shall be 60 s.

The loads shall be applied to the vertical members at the height of the top tread or, if this is not possible, just above the top tread (the uppermost horizontal ladder component).

G.3 Expression of results

The caravan holiday home shall be considered to have passed the test if, during the test, the ladder does not move, and after, the test has been completed on each bunk in the caravan holiday home, the ladder has not become loose, detached or broken, and there is no permanent deformation of its structure greater than 5 mm.

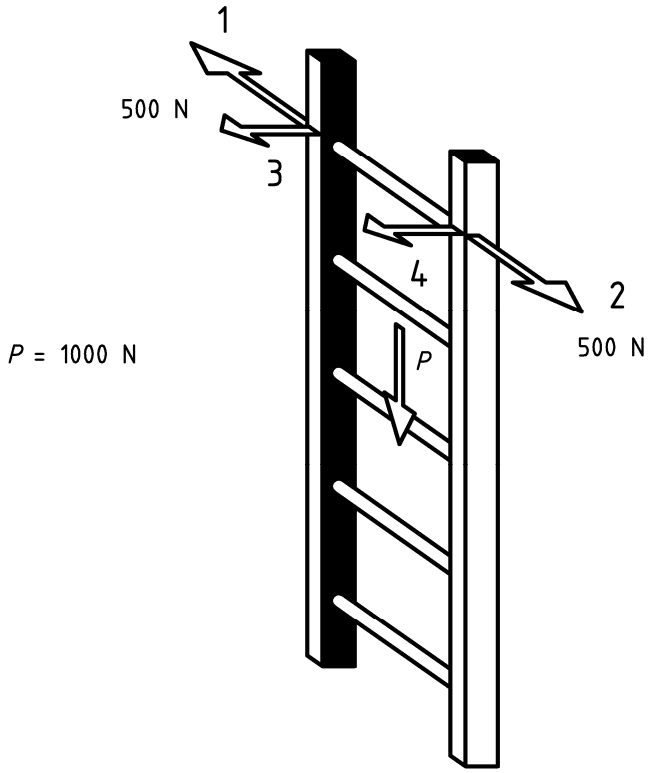
G.4 Test report

A test report shall be prepared stating whether or not the caravan holiday home passed the test.

The report shall state the following, if applicable:

a) whether it failed the test G.2.2;

b) the nature of the failure i.e. loosening, breakage, detachment or deformation, greater than 5 mm.



Key

1, 2, 3, 4, P directions to apply force for testing

Figure G.1 — Ladder attachment and deflection

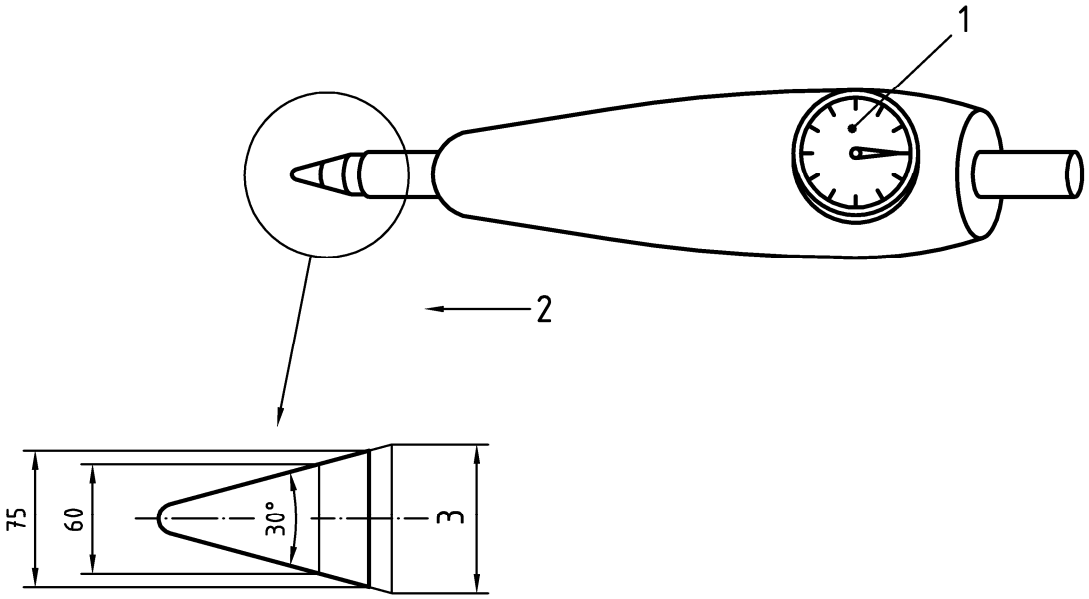
Annex H
(normative)

Measurement of gaps (see 6.1.7)

H.1 Cone measuring device

The cone measuring device (Figure H.1) shall consist of a cone with a smooth metal surface, mounted on a force gauge capable of giving an indication of an axial force of 100 N. Two lines shall be marked continuously round the surface of the cone, one where the diameter of the circular section of the cone is 60 mm and the other where the diameter is 75 mm.

Dimensions in millimetres



Key

1 force in N
2 direction of application of the force
3 diameter greater than 75 mm

Figure H.1 — Cone measuring device

H.2 Gaps in the base structure

Insert the point of the cone (see H.1) into the gap in such a way that its axis of symmetry is perpendicular to the plane that joins the boundaries of the gap. Advance the cone slowly and steadily further into the gap until the axial force of 100 N is indicated, under which condition the points of contact between the surface of the cone and the boundaries of the gap shall be the points where the diameter of the cone is 75 mm or at a position representing a smaller diameter.

Take measurements in as many places in any such gap as may be necessary to determine the most onerous conditions of dimension and distortion of the boundaries of the gap.

H.3 Measurement of gaps

Insert the point of the cone (see H.1) into the gap in such a way that its axis of symmetry is perpendicular to the plane that joins the boundaries of the gap. Advance the cone slowly and steadily further into the gap until an axial force of 100 N is indicated, under condition the points of contact between the surface of the cone and the boundaries of the gap shall be on or between the points at which the diameter of the cone is 60 mm and 75 mm.

Take measurements in as many places in any such gap as may be necessary to determine the most onerous conditions of the boundaries of the gap.

Annex I
(normative)

Test equipment

I.1 General

All test equipment shall be capable of operating within an accuracy range of ± 10 %.

I.2 Load measuring cell

Load measuring cell capable of measuring compression loads in the range from 450 N to 2 200 N.

I.3 Load measuring cell

Load measuring cell capable of measuring extension loads in the range 500 N to 1500 N.

I.4 Certified weights

Sufficient certified masses to meet the requirements of Annexes C and E.

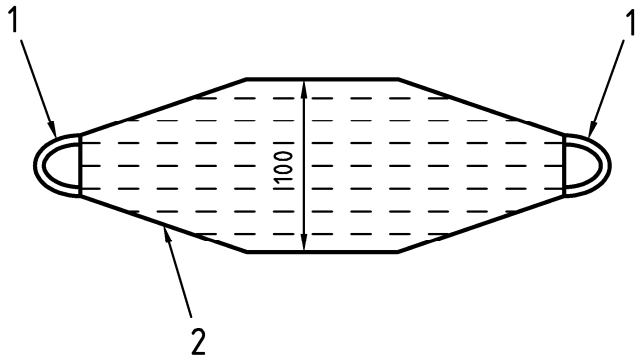
I.5 Load spreading platform

Load spreading platform 350 mm x 1 700 mm (corresponds to two thirds of the surface of a mattress or upholstery of 500 mm x 1 700 mm), not less than 12 mm thick, weighing between 5 kg and 10 kg (typically marine plywood).

I.6 Flexible load spreading device

Webbing or soft leather strap 100 mm wide with a hook on each end to enable attachment of load cell (see Figure I.1).

Dimensions in millimetres



Key

1 load cell attachment points

2 fabric or soft leather

Figure I.1 — Typical flexible load spreading device

I.7 Ball

Ball made of wood, of 100 mm diameter capable of being attached to a cone measuring device (see I.8).

I.8 Cone measuring device

Cone measuring device as described in Annex H.

Annex J
(informative)

Environmental aspects

Every product affects the environment in the course of its life cycle from raw material acquisition through production, distribution and use, to disposal. The environmental impacts are consequences of the consumption of energy and resources and the generation of waste as well as the emission of substances into air, water and soil. The magnitude of the environmental impacts during the various life cycles depends on a number of choices made in the design of the product. These relate to aspects such as choice of materials, production methods and the possibility of maintenance and recycling. If possible, manufacturers and distributors of leisure accommodation vehicles should consider the environmental impact of their product, for example by:

a) Avoiding the use of environmentally harmful substances;

b) Selecting the best available technology and techniques to reduce consumption of energy and materials;

c) Considering use of recycled materials for product and packaging.

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[4] Directive 2009/142/EC of the European Parliament and of the Council of 30 November 2009 relating to appliances burning gaseous fuels

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